RCA Solid State Division

Power Transistors

40250, 40250V1*, 40251

SILICON N-P-N POWER TRANSISTORS

General-Purpose Types for Industrial and Commercial Applications

RCA-40250, 40250V1, and 40251 are "HOMETAXIAL"-BASE diffused-junction, silicon n-p-n transistors intended for a wide variety of intermediate- and high-power applications. These transistors are especially suitable for use in audio and inverter circuits in 12-volt mobile radio and portable communications equipment.

Type 40250V1, with an attached heat radiator, is intended for those applications which require a rugged transistor for mounting on a printed-circuit board. Tabs are provided on the underside of the radiator for mounting purposes and for making electrical connection to the collector (which is connected internally to the mounting flange of the TO-66 Package).

* The "V1" suffix in the type number "40250V1" designates the first variant of the basic type 40250. The V1-version is a type 40250 transistor with an attached heat radiator for free-air operation.

- Designed to assure freedom from second breakdown in class-A operation at maximum ratings

40250

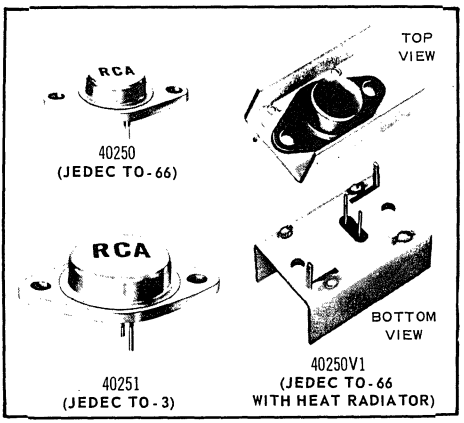
- JEDEC TO-66 package for mounting convenience and positive heat-sink contact
- V_{CEV} = 50 V min.
- f_T = 1.0 Mc/s typ.
- R(sat) = 1 Ω max.

40250V1

- Heat-radiator package with mounting tabs for printed-circuit-board application
- 5.8-W dissipation capability (at 25°C free-air temperature)
- V_{CEV} = 50 V min.
- f_T = 1.0 Mc/s typ.
- R(sat) = 1 Ω max.

40251

- High-dissipation capability — 117 W max.
- V_{CEV} = 50 V min.
- R(sat) = 0.1875 Ω max.
- f_T = 0.5 Mc/s typ.



MAXIMUM RATINGS

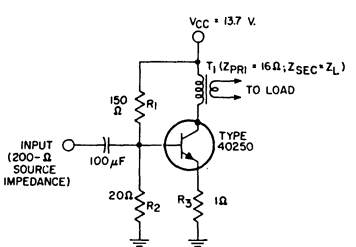
Absolute-Maximum Values:	*40250*	*40250V1*	*40251*	
COLLECTOR-TO-BASE VOLTAGE, V_{CBO}	50	50	50	V
COLLECTOR-TO-EMITTER VOLTAGE:				
With 1.5 volts of reverse bias, V_{CEV}	50	50	50	V
With base open, V_{CEO}	40	40	40	V
EMITTER-TO-BASE VOLTAGE, V_{EBO}	5	5	5	V
COLLECTOR CURRENT, I_C	4	4	15	A
BASE CURRENT, I_B	2	2	7	A
TRANSISTOR DISSIPATION, P_T:				
At case temperatures up to 25°C	29	–	117	W
At free-air temperatures up to 25°C	–	5.8	–	W
At temperatures above 25°C	See Fig.3	See Fig.4	See Fig.5	
TEMPERATURE RANGE:				
Storage & Operating (Junction)	← -65 to 200 →			°C
PIN TEMPERATURE (During soldering):				
At distances ≧ 1/32 in. from seating plane for 10 s max	← 235 →			°C

ELECTRICAL CHARACTERISTICS

Case Temperature (T_C) of 25°C Unless Otherwise Specified

Characteristic	Symbol	TEST CONDITIONS							LIMITS				Units
		DC Collector Volts		DC Emitter or Base Volts		DC Current (Amperes)			Types 40250 40250V1		Type 40251		
		V_{CB}	V_{CE}	V_{EB}	V_{BE}	I_C	I_E	I_B	Min.	Max.	Min.	Max.	
Collector-Cutoff Current	I_{CBO}	30					0		-	1	-	-	mA
	I_{CEV}		40		-1.5				-	-	-	2	mA
At T_C = 150° C	I_{CBO}	30					0		-	5	-	-	mA
	I_{CEV}		40		-1.5				-	-	-	10	mA
Emitter-Cutoff Current	I_{EBO}			5		0			-	5	-	10	mA
DC Forward-Current Transfer Ratio	h_{FE}		4 4			1.5 8			25 -	100 -	- 15	- 60	
Collector-to-Base Breakdown Voltage	BV_{CBO}					0.05 0.1			50 -	- -	- 50	- -	V
Collector-to-Emitter Breakdown Voltage	BV_{CEV}				-1.5 -1.5	0.05 0.1			50 -	- -	- 50	- -	V
Collector-to-Emitter Sustaining Voltage	$V_{CEO(sus)}$					0.1 0.2			40 -	- -	- 40	- -	V
Emitter-to-Base Breakdown Voltage	BV_{EBO}					0 0	0.005 0.01		5 -	- -	- 5	- -	V
Base-to-Emitter Voltage	V_{BE}		4 4			1.5 8			- -	2.2 -	- -	- 2.2	V
Collector-to-Emitter Saturation Voltage	$V_{CE(sat)}$					1.5 8		0.15 0.8	- -	1.5 -	- -	- 1.5	V
Power Rating Test	PRT		39			3			-	-	-	1	s
Thermal Resistance: Junction-to-Case	$\theta_{J\text{-}C}$								6.0 (max.) 40250		-	1.5	°C/W
Junction-to-Free-Air	$\theta_{J\text{-}FA}$								30 (max.) 40250V1		-	-	°C/W

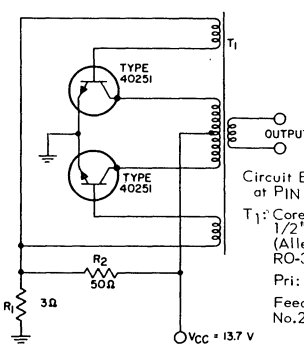
TYPICAL AUDIO-AMPLIFIER CIRCUIT FOR TYPE 40250



Distortion = 6.5% at P_{OUT} = 4 W
= 2% at P_{OUT} = 400 mW, f = 1 kc/s

Fig.1

TYPICAL INVERTER CIRCUIT EMPLOYING A PAIR OF TYPE 40251's



Circuit Efficiency = 82% at P_{IN} = 110 W, f = 3.5 kc/s

T_1: Core-toroid, 3" o.d., 1/2" x 1" cross-section (Allen-Bradley T3000H 106B), RO-3 material or equivalent.

Pri: 16 turns, No.20 wire, c.t.

Feedback Winding: 8 turns, No.22 wire, c.t.

Fig.2

DISSIPATION DERATING CURVE
FOR TYPE 40250

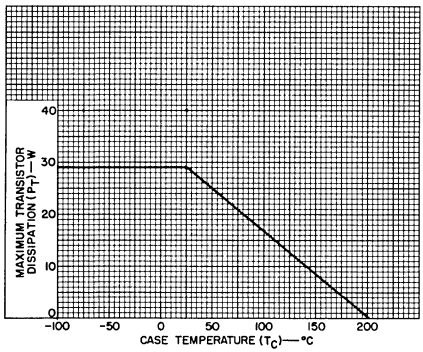


Fig.3 92CS-13005RI

DISSIPATION DERATING CURVE
FOR TYPE 40250V1

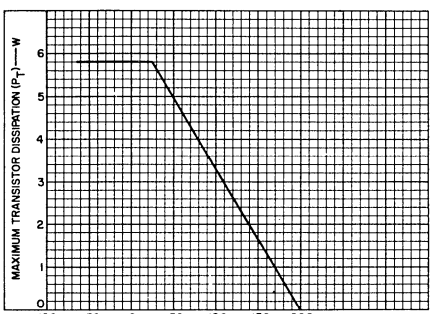


Fig.4 92CS-13373

DISSIPATION DERATING CURVE
FOR TYPE 40251

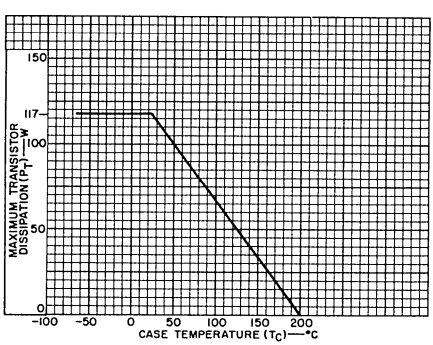


Fig.5 92CS-13031RI

TYPICAL OPERATION CHARACTERISTICS
FOR TYPES 40250 & 40250V1

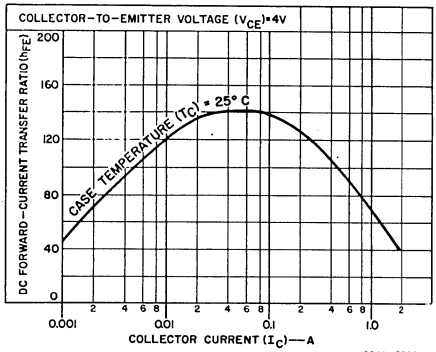


Fig.6 92CS-12564RI

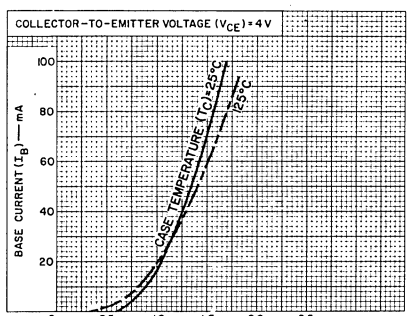


Fig.7 92CS-12305RI

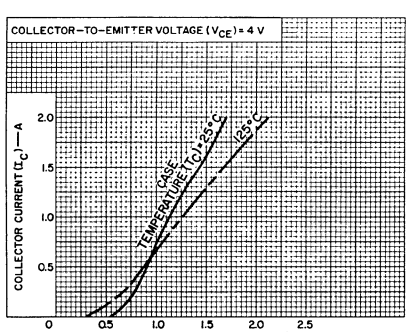


Fig.8 92CS-12325RI

TYPICAL OPERATION CHARACTERISTICS FOR TYPE 40251

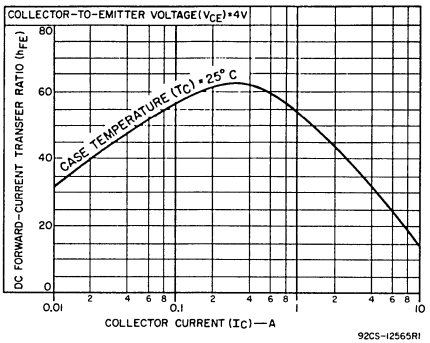


Fig.9

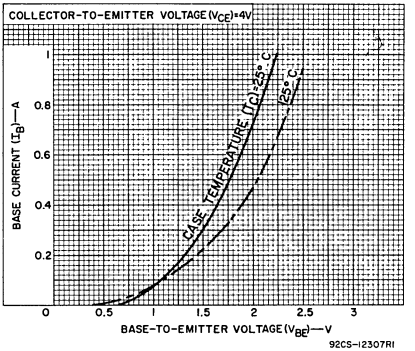


Fig.10

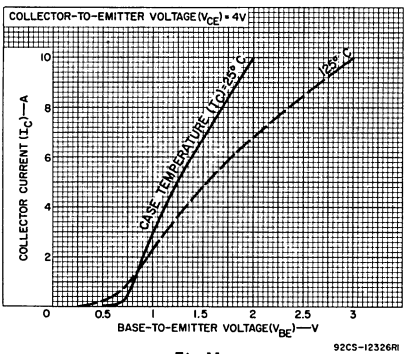


Fig.11

TERMINAL CONNECTIONS FOR TYPES 40250, 40250V1, & 40251

Pin 1 - Base
Pin 2 - Emitter
Flange, Case - Collector (For 40250 & 40251)
Heat Radiator - Collector (For 40250V1)